

ABSTRACT
DISCRETE MULTITONE TRANSMISSION SYSTEMS

- Systems for generating a discrete multitone signal are provided in which N carriers,
- 5 corresponding to respective subchannels, are modulated in each sample period (T) of the signal by performing an inverse discrete Fourier transform of N modulation symbols (X_k, \tilde{X}_k) , each of which symbols (X_k, \tilde{X}_k) represents a signal point in a QAM constellation for a respective subchannel, the QAM constellation comprising a basic constellation of $M \geq 2^m$ signal points where m is the number of data bits to be communicated over the subchannel in a sample period.
- 10 For each of $N_c \leq N$ of the subchannels, an expanded QAM constellation is defined which comprises pM signal points including said basic constellation of points, where p is an integer greater than 1. In each expanded constellation, $p-1$ equivalent signal points are defined for each signal point of the basic constellation, where each of the $p-1$ equivalent points is selected from redundant points in the opposite quadrant of the constellation to the corresponding point of the
- 15 basic constellation. The discrete multitone signal is generated in a sample period (T) by selecting, for each of the N_c subchannels, the modulation symbol (X_k, \tilde{X}_k) representing either a basic constellation point or a corresponding equivalent point such that the peak value of the signal does not exceed a predetermined threshold.